

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.

1. AGENCY USE ONLY (Leave Blank)	2. REPORT DATE 8 August 1997	3. REPORT TYPE AND DATES COVERED Final Report 1 March 1990 - 30 September 1996
----------------------------------	---------------------------------	---

4. TITLE AND SUBTITLE Sea Beam/SeaMARC II Studies of the East Pacific Rise and its Flanks in Preparation for a Geologic/Acoustic Natural Laboratory	5. FUNDING NUMBERS G N00014-90-J-1645
--	--

6. AUTHORS Ken C. Macdonald

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Marine Science Institute University of California Santa Barbara, CA 93106	8. PERFORMING ORGANIZATION REPORT NUMBER
---	--

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) Lee R. Washington ONR San Diego Regional Office 4520 Executive Drive, Suite 300 San Diego, CA 92121-0319	10. SPONSORING / MONITORING AGENCY REPORT NUMBER
--	--

11. SUPPLEMENTARY NOTES

12a. DISTRIBUTION / AVAILABILITY STATEMENT DISTRIBUTION STATEMENT A Approved for public release Distribution Unlimited	12b. DISTRIBUTION CODE
--	------------------------

13. ABSTRACT (Maximum 200 words)

The primary project objective, to establish a long-term Geologic/Acoustic Natural Laboratory (GANL) near 7°50'-10°30'N on the East Pacific Rise, has been achieved and published in a widely circulated map series. The GANL for a fast-spreading environment includes total coverage at a large scale within the area using combined Sea Beam and SeaMARC II bathymetry and side scan sonar. This objective has been achieved not only for the designated ONR Laboratory, but also for the East Pacific Rise and its flanks from 7°N to 18°N. We have also completed most of the quantitative interpretation of these data to assess the roles of faulting vs. volcanism in creating the ubiquitous abyssal hills of the ocean floor, the most common yet poorly understood terrain element on the earth's solid surface.

14. SUBJECT TERMS Seafloor topography, mid-ocean ridge, natural laboratory		15. NUMBER OF PAGES 2	
		16. PRICE CODE N/A	
17. SECURITY CLASSIFICATION OF REPORT Unclassified	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT UL

NSN 7540-01-280-5500

Standard Form 298 (Rev. 2-89)
Prescribed by ANSI Std. Z39-1
298-102

DTIC QUALITY INSPECTED 3

FORM A2-2

AUGMENTATION AWARDS FOR SCIENCE & ENGINEERING RESEARCH TRAINING (AASERT)
REPORTING FORM

The Department of Defense (DOD) requires certain information to evaluate the effectiveness of the AASERT program. By accepting this Grant Modification, which bestows the AASERT funds, the Grantee agrees to provide the information requested below to the Government's technical point of contact by each annual anniversary of the AASERT award date.

1. Grantee identification data: (R & T and Grant numbers found on Page 1 of Grant)

- a. Regents of the University of California
University Name
- b. N00014-90-J-1645 c. 4253121---05
Grant Number R & T Number
- d. Ken C. Macdonald e. From: 1 Jun 1992 To: 30 Sep 1996
P.I. Name AASERT Reporting Period

NOTE: Grant to which AASERT award is attached is referred to hereafter as "Parent Agreement."

2. Total funding of the Parent Agreement and the number of full-time equivalent graduate students (FTEGS) supported by the Parent Agreement during the 12-month period prior to the AASERT award date.

- a. Funding: \$58,422 (1Mar91-31 Oct92)
- b. Number FTEGS: 7

3. Total funding of the Parent Agreement and the number of FTEGS supported by the Parent Agreement during the current 12-month reporting period.

- a. Funding: \$ N/A (Extension period)
- b. Number FTEGS: 4

4. Total AASERT funding and the number of FTEGS and undergraduate students (UGS) supported by AASERT funds during the current 12-month reporting period.

- a. Funding: \$100,475
- b. Number FTEGS: 1
- c. Number UGS: 0

VERIFICATION STATEMENT: I hereby verify that all students supported by the AASERT award are U.S. citizens.

Ken C. Macdonald
Principal Investigator

8/11/97
Date

**ONR FINAL REPORT: GEOLOGIC/ACOUSTIC NATURAL
LABORATORY ON THE EAST PACIFIC RISE [N00014-90-J-
1645]**

K. C. Macdonald, Department of Geological Sciences, UCSB, Santa Barbara, CA 93106

Our goal has been to understand the primary variables that control the shape of the deep ocean floor, and to facilitate the efforts of other ONR researchers toward this goal by making high resolution bathymetric and side-scan sonar data available to the ONR community. The primary project objective, to establish a long-term Geologic/Acoustic Natural Laboratory (GANL) near 7°50'-10°30'N on the East Pacific Rise, has been achieved and published in a widely circulated map series. The GANL for a fast-spreading environment includes total coverage at a large scale within the area using combined Sea Beam and SeaMARC II bathymetry and side scan sonar. This objective has been achieved not only for the designated ONR Laboratory, but also for the East Pacific Rise and its flanks from 7°N to 18°N. We have also completed most of the quantitative interpretation of these data to assess the roles of faulting vs. volcanism in creating the ubiquitous abyssal hills of the ocean floor, the most common yet poorly understood terrain element on the earth's solid surface [see Alexander and Macdonald, 1996].

List of most significant publications :

Alexander, R. T., and K. C. Macdonald, Small off-axis volcanoes on the East Pacific Rise, *Earth and Planetary Science Letters*, 139, 387-394, 1996.

Alexander, R. T., and K. C. Macdonald, Sea Beam, Sea MARC II, and ALVIN-based studies of Faulting on the East Pacific Rise 9°20'-9°50'N, *Mar. Geophys. Res.*, 18, 557-587, 1996.

Carbotte, S. and K. Macdonald, East Pacific Rise 8°-10°30'N: Evolution of ridge segments and discontinuities from SeaMARC II and three-dimensional magnetic studies, *J. Geophys. Res.* 97: 6959-6982, 1992.

Carbotte, S. M., and K. C. Macdonald, Comparison of seafloor tectonic fabric at intermediate, fast and super fast spreading ridges: influence of spreading rate, plate motions, and ridge segmentation on fault patterns, *J. Geophys. Res.*, 99, 13609-13631, 1994.

19971022 086

Carbotte, S. M., and K. C. Macdonald, The axial topographic high at intermediate and fast spreading ridges, *Earth Planet. Sci. Lett.*, 128, 85-97, 1994.

Macdonald, K. C., D. S. Scheirer, and S. M. Carbotte, Mid-ocean ridges: Discontinuities, segments and giant cracks, *Science*, 253, 986-994, 1991.

Macdonald, K.C., Mid-oceanic ridge, in Parker, S.P., ed., McGraw-Hill Yearbook of Science & Technology, McGraw-Hill, Inc., New York, 259-262, 1992.

Macdonald, K.C., P.J. Fox, S. Miller, S. Carbotte, M.H. Edwards, M. Eisen, D.J. Fornari, L. Perram, R. Pockalny, D. Scheirer, S. Tighe, C. Weiland and D. Wilson, The East Pacific Rise and its flanks 8-18°N: History of segmentation, propagation and spreading direction based on SeaMARC II and Sea Beam studies, *Mar. Geophys. Res.* 14:299-344, 1992.

Macdonald, K.C., D.S. Scheirer, S. Carbotte and P.J. Fox, It's only topography, *GSA Today*, Jan/Feb, 1993.

Scheirer, D. S., and K. C. Macdonald, Variation in cross-sectional area of the axial ridge along the East Pacific Rise: Evidence for the magmatic budget of a fast-spreading center, *J. Geophys. Res.*, 98, 7871-7885, 1993.

Scheirer, D. S., and K. C. Macdonald, Near-axis seamounts on the flanks of the East Pacific Rise, 8°N to 17°N, *J. Geophys. Res.*, 100, 2239-2259, 1995.